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West Europe Report

SCIENCE AND TECHNOLOGY

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WEST EUROPE REPORT

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CONTENTS

ADVANCED MATERIALS

FRENCH RESEARCH IN AMORPHOUS SILICON, GALLIUM ARSENIDE

Paris MESURES in French 4 Nov 85 pp 14-15

[Excerpts] The meeting of J. Salomon, professor and researcher at Polytechnic University, and the EMS Company (Equipment Mecanique Specialise) [Specialized Mechanical Equipment], subsidiary of IDI [possibly Institut de Development Industriel--Institute of Industrial Development] led to the formation of the Solems Company, now a 90 percent subsidiary of the Total-CFP Group. The amorphous branch uses considerably less silicon than does the crystalline because the semiconductor layer is 100 to 300 times less thick. In addition, the crystalline branch uses electronic-grade silicon, very pure and thus quite expensive, while the amorphous [material] originates from an intermediate gas (silane); the production method requires less labor and less energy but a larger initial investment.

Photovoltaic cells of amorphous silicon are distinctly advantageous under fluorescent lighting (more blue than sunlight). Besides, their weak leak resistor allows them to function in very low light: even below 50 lux (against 5000 lux for crystalline) in poorly-lighted zones, offices, workshops, places where small appliances operate.

The positive results are encouraging the researchers to continue their experiments. In particular, at the Paul Sabatier University (Toulouse) Laboratory of Electrical Engineering, attempts are being made to join the techniques of depositing amorphous silicon by plasma, with that of cathode (sputtering) of a gallium electrode (in an arsine (AsH_3) atmosphere) to produce amorphous gallium arsenide (As_xGa_y) in one step. This technique allows the preparation of films varying in content from only arsenic to only gallium (interest : electrodes), in stoichiometric proportions. In six or seven months, one will be able to say if such a deposition technique will work for future solar cells...it is proper, of course, to have accomplished some connections previously.

Some New Flat Screens

These solar panels of amorphous silicon have several qualities which are interesting to certain laboratories working on flat screens. Such is the case of LETI [Laboratoire de l'Electronique et de Technologie de l'Informatique] which started on the cells, and is now developing screens of liquid crystals deposited on an active matrix of transistors in thin layers.

Thompson and CNET (Lannion) [Centre National des Etudes de Telecommunications] are also researching these flat screens. Why this interest? First from the fact of the possibility of making some screens of relatively large dimensions.

But there are also some column registers which should function at 10 MHz and transmit a lot of current, because they are the ones which are ultimately going to address a pixel of the screen. There, amorphous silicon is certainly no longer suitable. But at LETI, people are working on making matrices and registers suitable. A method has been set up to illuminate silicon, during its deposition, by a UV laser, in order to form some polycrystalline silicon (grains of some thousands of angstroms) of good electronic quality (in particular, dopable), at the same time as amorphous silicon is being deposited.

12843/12859
CSO: 3698/185

ADVANCED MATERIALS

BRIEFS

FRENCH CARBON FIBER PRODUCTION--Approximately 100 metric tons of carbon fiber will be produced next year in the Elf/Pechiney/Toray (Soficar) factory in Abidos (64). Initial plans are for the production of 3K (3000-filament) Toraya T 300 fiber. There are also plans for the subsequent manufacture of 6K fiber of the same grade, as well as for the production of T 400 fiber, which has better elongation (1.8 percent as compared to 1.5 percent). Most of the production of this fiber, marketed under the French name Filkar, should be absorbed by the European aeronautics market. It takes 2.5 kg of the fiber's precusor, Pan (still a Toray product), to manufacture 1 kg of fiber. [Text] [Paris INDUSTRIES ET TECHNIQUES in French 1 Nov 85 p 8] 12014/12913

KRUPP AUTOMATED COMPOSITES CUTTER--In the production of composite plastic components for the aircraft and automobile industries, reinforcement materials made of carbon, glass or Aramid fibers, as well as core layers (honeycombs), are being cut to size on NC machines. In conjunction with MBB GmbH in Donauwoerth, Krupp Datenverarbeitung GmbH (Krupp Data Processing) in Essen has developed a new version of the ASCO (automatic cutting plan optimization) program system. The system reduces the time required for nesting and processing, reduces material consumption during cutting and eliminates waste by means of a completely automated process from awarding of the contract to accomplishment of the complete cutting plan on the cutting machine. The ASCO cutter continuously supplies the NC data required for maximum machine utilization and by virtue of its complete integration into the user's production concept provides great flexibility in overcoming possible production bottlenecks. [Text] [Coburg MASCHINE + WERKZEUG in German 18 Oct 85 p 8] 12552

NEW GALLIUM PRODUCTION METHOD--Elkem, the Norwegian metallurgical group, has perfected a new patented process for the production of gallium used in the electronic industry. Elkem expects to produce about 5 tons/year starting in 1986. To improve its understanding of gallium refining, Elkem has bought Crystalox, a British company specializing in this business. [Text] [Paris INFORMATIONS CHIMIE in French Oct 85 p 133] 12843/12859

CSO: 3698/185

AUTOMOBILE INDUSTRY

BOSCH OF FRG DEVELOPS AUTO NAVIGATION SYSTEM USING SENSORS

Duesseldorf VDI NACHRICHTEN in German 1 Nov 85 p 16

[Article by C. Reuber: "Instrumentation and Control. A Navigation System Optimizes Use of Automobile: System Senses Movement Relative to Road Surface--Determines Direction"]

[Text] Increasing along with the possible applications of microelectronics and the growing number of cars on the road, is the number of proposals for navigation systems which will make it easier for the driver to reach his destination. All such systems fulfill the two requirements of navigation and determining location, i.e. they sense the present position and determine the direction of travel when location and destination are entered. Remote locating or autonomous on-board locating systems are the terms used depending on whether or not the system has an external infrastructure, e.g. induction loops embedded in the road, infrared beacons at intersections or even signals from navigation satellites.

Dead-reckoning navigation, the combining of sections of roadways according to distance and direction driven, naturally requires assistance in correcting its mistakes, whereby a comparison of the locating results using a street map is a suitable solution: cars travel on roads and not across fields or through rows of houses. While the distance involved in the sections can be measured relatively simply and precisely, measurement of the curve angle for the direction of travel presents problems. A number of suggestions have therefore been made for measuring the angle. Another problem area is the "electronic road map" and the associated problems of entering the starting point and destination.

The "driver information and control system" (ALI) developed at Blaupunkt, based on a proposal by Dr Wido Kumm of Paderborn, requires an infrastructure involving induction loops and computers in order to provide recommended directions for remote navigation on the freeway for example. For local in-city navigation this system can be complemented by use of the autonomous on-board "electronic automobile co-pilot for the driver" (EVA) which was developed at Blaupunkt in collaboration with Dr Gerhard Schweizer of Karlsruhe. EVA has been used successfully in the Hildesheim area for several years; vehicles equipped with EVA have proven the effectiveness of the system in approximately 7000 km of total distance traveled.

According to a report by Rainer Hankel, head of the Bosch Research Institute in Berlin, EVA is nevertheless not yet ready for general use in its present form. The main problem is the envisaged computer storage of the city map which assists EVA's dead-reckoning navigation. Experience in Hildesheim has shown that one to two bytes per city resident would be needed--for Berlin this would mean at least two megabytes. For a number of cities this could be realized rather simply using a compact disc, but not with cheap, easy-to-use semiconductor mass storage devices. Automatic processes for digitization, converting the graphical city map to computer-readable data, also have yet to be developed.

For a small group of users, however, within a fleet of company cars for example, economically feasible systems are already possible today. The Bosch Research Institute of Berlin has proposed an EVA modification called "locating of motor vehicles for dispatch control" or OKE for the project entitled "Automated On-Demand and In-Service Dispatching of Public Transportation Vehicles" being prepared by the Local Transportation Study Group (SNV). This system will continuously determine the locations of a fleet of vehicles--vehicles used by public safety organizations, public transportation companies, delivery services and other service-related businesses--which are dispatched by radio from a central location.

Rather than the wheel-revolution counter used by EVA, the Bosch Research Institute of Berlin is proposing an optical correlation sensor for measuring distance and angles. This method of determining movement relative to a statistically rough surface--in the case of motor vehicles relative to the surface of the road--has been known in principle for some time. In silicon technology, its components, prism grids and photodiodes, can be combined in a diode array, and this greatly simplifies construction and increases design options.

These diode arrays currently consist of four sets of comb-like interlaced strips integrated into a silicon chip. Such diode structures are cleverly combined to permit suppression of the DC signal on the one hand and to detect two-dimensional motion with proper sign detection on the other hand. Two signals are thus received, the frequencies of which are proportional to the components of the velocity vector referred to one axis of symmetry.

On this subject Rainer Hankel says, "The measurement accuracy which can be achieved using such a principle ought to be within one percent. Test drives at the plant in Berlin-Wilmersdorf over a distance of 800 meters in which the deviation was less than one meter from the point of origin, for example, show that this figure is not utopian."

Taking narrow city streets into account, a city map support system is also planned for this optical correlation sensor for OKE. For this project, the roads are skeletized and broken down into grid points such that the roads appear as lines on a grid. This information can be stored in a semiconductor memory which, if the proper grid size is chosen, would require a capacity of only 128 Kbyte (1 Mbit) for Berlin. In the future it will be possible to accomplish this with a single semiconductor component.

The goal of the project underway at the Bosch Research Institute in Berlin is to be able to detect vehicle locations autonomously and in real time. This will allow the dispatch of fleet vehicles in radio contact with a control center and equipped with OKE to be optimized without the necessity of a special infrastructure, according to Rainer Hankel.

12552
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BIOTECHNOLOGY

BIOGEN, UNDER NEW LEADERSHIP, OUTLINES RECOVERY STRATEGY

Munich INDUSTRIEMAGAZIN in German 15 Nov 85 pp 106,110,111

/Text/ The example of Biogen, one of the leaders on the market, shows what a difficult and lengthy process it is to enter gene technology. A current, three-phase strategy should finally get the enterprise out of the red.

Investors had to pay a hefty $23 for shares of Biogen N.V. when it was introduced on the stock market. They all did it willingly because Biogen is one of the largest internationally run gene technology companies on the world.

Nevertheless, the confidence of the investors was greatly shaken suddenly. In December 1984 the stock of the Biogen Company fell to five dollars.

Dr Walter Gilbert, executive director and founder of the enterprise which is registered in the trade registry of the Dutch Antilles for tax reasons, is managed from Geneva, and has laboratories in Cambridge, Massachusetts and Zurich as well as marketing companies in Belgium and the Netherlands, had been placed under massive pressure by the powerful partners of the enterprise (see graphic presentation) quite unexpectedly resigned.

Gilbert, the holder of a Nobel price in chemistry, wanted to continue as a scientist rather than set the company on a winning course. He preferred "to make place for fresh forces" and went to sail on the South Sea. Biogen was without a leader.

And yet, it seems that the shareholders can raise their hopes again. After a brief interim management by Mark Skaletsky (35), at the end of October an expert well versed in the branch took over the chairmanship of Biogen: James L. Vincent (46), formerly group vice president of Allied-Signal Inc, Morristown, N.J. and manager there of a new daughter company making body care products.

The basic management believes to have found in Vincent the man who will successfully complete the ambitious plans introduced but only half-heartedly followed by Gilbert: restructuring from a research to a production enterprise.

It is a step long overdue. Contract development for third parties alone cannot erase the deficit in which the gene company finds itself up to its neck. just like nearly all its competitors. Meanwhile, the losses added up to $43 million by 30 June 1985. Although the enterprise earned some $31.4 million in 1984, mainly from fees for research and development, it had to spend $44.5 million during the same period.

In contrast with pure research done on commission, there are considerably better chances in the production and marketing of products financed by the enterprise itself. The emphasis must be exclusively on pharmaceutical preparations. The reason is that they can be converted considerably faster into marketing successes, and they promise better profit margins and higher returns than the tedius projects in agriculture, environmental protection, energy and mining. These would also be temporarily halted then.

The turnabout toward profit oriented production will be accomplished by the management in three phases which are coupled with considerable financial, personnel and technical consequences since Biogen is entering a vastly new territory:

--Development of various preparations all the way to production readiness;

--Build up of its own production;

--Build up of its own marketing team.

The first step had been introduced by the management already under Gilbert's leadership in 1982: the independent development of gamma-interferon and interleukin-2. These are two of the most promising gene technological preparations against cancer, inflamations and diseases of the immune system.

In a highly contested market--70 competitors are working on interferon alone--the Swiss have already secured themselves a considerable advantage. As a first and so far only undertaking, clinical tests on humans were started by Biogen. Current situation: gamma-interferon proved to be extremely effective against rheumatic disease and also against kidney cancer.

Clinical tests are the hardest part of this first stage. They swallow up enormous sums.

The necessary capital was obtained by the management first by entering the stock Market (March 1983) which brought in $53 million. At the time 13 percent of the stock capital was issued.

Half of the money was spent on setting up a group for clinical testing where outstanding people were recruited from pharmacological companies such as Bristol-Myers, Schering-Plough or Monsanto ("with us, they have considerably better chances of rising" was Skaletsky's confident comment).

In addition, the medical research and process divisions were also expanded. In total, Biogen contracted over 60 new co-workers in 1983 and over 100 in 1984. Currently the company has about 380 employees, one-third of them graduates with a doctorate degree.

Specifically for the testing and marketing of gamma-interferon in Germany, Biogen has additionally secured the know-how of an experienced partner. In early 1984, the Swiss had bought 50 percent of Bioferon Biochemical Substances GmbH, Laupheim. In 1983 the company received from the Federal Bureau of Health the first permit anywhere on the world for an interferon product ("Fiblaferon").

"With this step we secured for ourselves entry to the greatest European pharmaceutical market" stresses Skaletsky who expects to introduce gamma-interferon and interleukin-2 on the market by 1987.

In order to provide the necessary conditions, a new large-technological production facility is slated to be completed in Geneva in the same year, financed by leasing. Because, as the second step of the new strategy, Biogen will also manufacture the newly developed products under its own management.

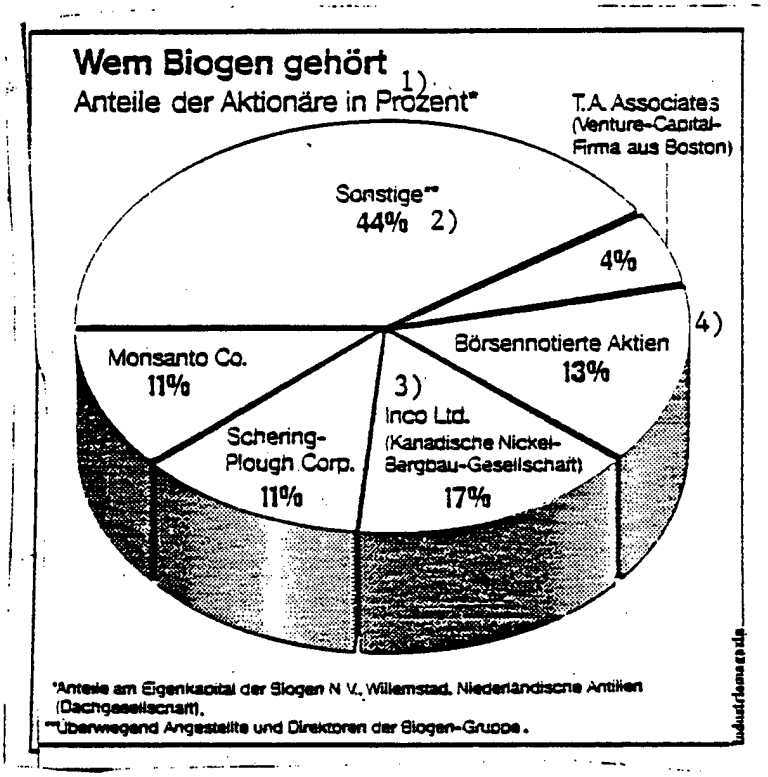
Because the laboratories in Zurich and in Cambridge have only smaller, pilot fermentors (1,000 to 1,500 liters volume capacity) supplying their own needs, construction of a large facility (3,000 liters) was started already in June 1984. It includes the most modern, efficient fermentation, purification and recovery facilities "which make possible an immensely high yield" confirms Bioferon Chief Dr Johann-Friedrich von Eichborn. Large amounts of raw product are produced by particularly potent bacteria already in the fermentation process and the purification of this brew, containing in part poisonous by-products, at 30 percent is also "extremely effective" (von Eichborn).

If the clinical tests and acceptance as a therapeutic substance proceed according to plans, the product sales from gamma-interferon and interleukin-2 should not only lead the marketing partners, such as Bioferon or Shionogi and Co, Ltd, Japan, to a new spurt in growth during 1986-87 but they should also help to exceed the long-awaited break-even point.

The profits are already spoken for. Namely, they should finance the third and last phase of restructuring: building up their own marketing team and also deriving direct profits from the market opportunities for gene preparations. "These are much more costly than the entire development of a preparation" notes Skaletsky who does not expect to have their own outside service for 10 years.

In order to gather the first experiences, Biogen has already secured the North-American co-marketing rights for the antitumor compound TNF which is being developed for the BASF-daughter Knoll AG.

Accordingly, Biogen is still far from standing on its own feet. Additional sources of financing should close the gaps until then. Therefore, in May 1984, the company established the Biogen Medical Product Limited Partnership, a tax-preferred form of investment for U.S. investors which raised $28 million.



Key: 1. Biogen belongs to:
Fraction of stockholders in percent*
2. Others
3. Inco Ltd (Canadien Nickle Mining Company)
4. Stocks registered on stock exchanges

* Fraction of capital owned by Biogen N.V., Willemstad, Dutch Antilles (Parent organization)

** Mostly employees and directors of the Biogen group

In addition, the management signed six new license agreements in 1984 in order to keep open the traditional source of income, FuE-fees, also for the next few years. Among these are contracts with Kabivitrum AB/Sweden (growth hormone), Smith Kline and French Laboratories/Philadelphia, Pennsylvania, (tissue plasminogen-activator TPA against blood clotting) and the Wellcome Foundation Ltd/Great Britain (hepatitis-B vaccine).

Biogen is currently engaged in 21 research projects from 15 customers. From each agreement, income between 5-15 million dollars is expected in the case of commercial success.

Next year at the latest, considerable license incomes should also be coming from the farthest-advanced cooperation agreement so far, the contract with their own division, the Schering-Plough Corp, Madison, N.J., for developing alpha-interferon. Shering has already applied for a permit for "Intron" against certain types of tumor and for preventing colds, in the U.S. and in Western Europe; in Ireland where Shering has its $100 million production facility for "Intron," in Italy and in the Philippines the medication is already on the market. The trade volume for the spray against colds alone is estimated at $290 million by 1990.

On the other hand, the example of alpha-interferon also makes it clear what hard obstacles to market advantages are being fought by gene technology. In May 1985, Biogen had submitted the first patent complaint world-wide in DNA technology. Reason for the complaint was the alpha-interferon eye drops distributed "without license" by the Austrian daughter firm of Boehringer-Ingelheim. Biogen has held an European patent for alpha-interferon since 1984 and a U.S. patent since 1985.

Boehringer immediately fired back and aligned itself with the six companies protesting against the Biogen patent. Although the Geneva firm was able to reach an agreement with one of the opponents, the Genetech cooperation partner F. Hoffman-La Roche and Co, AG, Basel, nevertheless, the fight with Boehringer-Ingelheim is about to reach a new height. "We have now introduced new material into the investigation which could lead to a revocation of the patent" explains Dr Dieter Laudien, head of the Boehringer patent division.

"There are simply too many offers on the Interferon market" explains Skaletsky this awkward situation. He sees considerably greater future chances in totally different groups of product:

--In the second, improved generation of earlier gene technolological products. Biogen, for instance, is working specifically on TPA against blood clotting but with a considerably longer life than its predecessor which is in the program of nearly all gene pioneers;

--In competition-free special products and individual developments such as, for instance, the recent success of Biogen with the anti-inflammatory compound Lipocortin. Next to antibiotics, such drugs are the second largest group on the global pharmaceutical market. "Lipocortin could become one of our most important products" hopes research director Dr Richard A. Flavell.

In the search for new preparations suitable for gene technology, Biogen can rely on a strong scientific background. New ideas come not only from the Scientific Board of the company consisting of very valuable experts such as Dr Charles Weissmann, discoverer of alpha-interferon, but also from a systematic search process using outside consultants. Diseases not as yet under control are discussed with them and an attempt is made by Biogen to develop medication against them in a targeted manner.

The work in their own laboratories, where Lipocortin originated, for instance, has also become "more product oriented" confirms Professor Dr Heinz Schaller, member of the scientific board and director of the Institute of Microbiology in Heidelberg. At the same time, organizational devices, precise hourly plans and concretely targeted tasks have also entered into the formerly quite free work atmosphere.

Therefore, the Swiss company, which is among the few "which can survive and prosper" according to Eichborn, is concerned less about the possibility of creating new gene technological products than about their much too scarce presence on the makret. Since 1984, Biogen itself sold only a relatively insignificant hepatitis-B-nuclear antigen for diagnostic purposes.

In addition, the U.S. Food and Drug Administration has recently delayed approval for a growth hormone to which great hopes were attached by the competitor Genentech Inc, San Francisco.

"This is quite a disappointment not only for Genentech but also for the entire industry" deplores Skaletsky. The interim head of Biogen explains his remark: "At the moment it is not so important which gene technological operation is ahead as that the greatest possible number of products on the market in order to promote a breakthrough for the new technology."

2473/12276
CSO: 3698/186

BIOTECHNOLOGY

BRIEFS

FRENCH ARTIFICIAL SEED RESEARCH--Farmers must resign themselves to the fact that, in the future, seeds will be artificial. They will be in the form of small spheres of gel, which protect and nourish the carrot, alfalfa, geranium, or camellia embryos. The techniques of "in vitro" culture were selected by the Department of Research and Technology among the principal themes of studies proposed by France this coming 5-6 November in Hanover, within the framework of the Eureka technology program. High-performance seeds, produced rapidly in unlimited quantities.... Planted in greenhouses or in the ground, they germinate exactly like our good old-fashioned seeds. Only their conception is revolutionary, a clone created in the laboratory, a simple small piece of parental tissue multiplied and transplanted into favorable nutrient medium, which allows millions of plantlets to be produced which are specially selected for their nutritional characteristics, and their resistance to disease or climatic conditions. From now on, it will not be necessary to wait for years for successive crosses to yield new varieties with advantageous genetic characteristics. "From a few cells removed from an exceptional wheat plant, one individual can be cloned in thousands of copies within a period of one to three months," reports Yves Demarly, director of the laboratory for the study and utilization of plant polymorphism at the University of Orsay where these "somatic" embryos (conceived without fertilization) are grown. Another advantage is that because they are produced in the laboratory, all the sugar beet seeds required for France for one year could be kept in a room of less than one hundred cubic meters! The Orsay team is now trying to develop better storage methods for the test tube embryos so that they can be stored and sent to other countries. Currently, the small spheres of nutrient gel in which the future plants get bigger and better must in fact be planted within eight days, or they will become unusable. The solution may be freezing or an additional protective coating. For each plant variety, the most suitable cocktail to be introduced into the gel remains to be determined: vitamins, growth hormones and insecticides, as well as preventive vaccines against the most prevalent infectious diseases. First affected by the somatic embryo technique will be the most expensive plants to produce: ornamental plants and fruit trees. [Excerpts] [Paris SCIENCES & AVENIR in French Nov 85 p 8] 13146/12859

TRANSGENE INCREASES CAPITAL--The French genetic engineering laboratory Transgene, created in 1980 at Parisbas initiative, will increase its 81,000,000-franc capital to 121,000,000 francs. Transgene, which employs 80 researchers in its Strasbourg laboratory, has acquired an international reputation, insuring a considerable increase in contracts. Transgene's current major shareholders are: Assurances Generales de France, Boussois-Souchon-Neuvesel, Moet Hennessy, Parisbas, Societe Nationale Elf-Aquitaine (65 percent); the Centre National de Recherche Scientique, the Institut National de Recherche Agronomique, the Institut National de la Sante et de la Recherche Medicale, and the Institut Pasteur (23 percent). The remaining 12 percent is privately held. Transgene changed presidents several days ago. Its founder, R. Lattes, had submitted his resignation and was replaced at his suggestion by Raymond Maurice Doumenc, also president of Ciments Francais. Robert Lattes was named honorary president of Transgene. He will continue to sit on the board and to contribute his support and expert knowledge to the company. In addition, Etienne Eisenmann will continue as company general manager. [Text] [Paris INFORMATIONS CHIMIE in French Nov 85 p 39] 12014/12913

CSO: 3698/219

CIVIL AVIATION

COMPONENTS IN AIRBUS A.320 INSTRUMENT PANEL DESCRIBED

Paris ZERO UN INFORMATIQUE HEBDO in French 21 Oct 85 pp 26, 28

[Article by Nicolas Rousseaux: "The Airbus 320 at Thomson-CSF: Six Screens for an Instrument Panel"]

[Text] Since 1979, Thomson-CSF has launched a program of electronic displays for aircraft instrument panels. The future Airbus 320 will be state-of-the-art in that respect. No more minidials... Screens everywhere. Airplanes will be piloted like video games!

The trend was started by Boeing in the late 1970's: Airbus had to follow and meet the challenge. What challenge? Piloting aircraft not just mechanically, but electronically! One of the applications of cabin computerization is screwed directly on the instrument panel: a few TV screens are replacing the traditional tens of minidials.

As a result, the new-generation pilot controls his machine as he would a video game, using a joystick for a control stick. Computers do all the work and airlines can dispense with the traditional flight engineer.

In France, it was the supersonic Concorde project that launched manufacturers into avionics. At the time of the Caravelle, French equipment was not yet truly in the race. The Airbus, selling better than the Concorde, led in turn to some entirely new research and development, including the famous "full color electronic" instrument panel designed and manufactured by Thomson-CSF engineers and technicians.

We went to meet them, at the AVG, General Avionics Department, in Issy-les-Moulineaux, a near suburb south of Paris.

Navigation and Steering on Screen

This department of the Thomson-CSF Avionic Equipment division employs over 2,300 people for sales of around Fr 1 billion, including 85 percent from military equipment. Eventually, the goal is to raise the share of the civil sector to 50 percent. Exports account for 60 percent of production.

Alain Martres, 36, a Supelec engineer, was hired by Thomson in 1973 as development engineer to work on electronic displays. He worked on the Persepolis project--experimentation of a new type of instrument panel--at the Bretigny flight test center. He then collaborated in delivering to the Soviets the instrument panel of the Tupolev 154 (the equivalent of the Boeing 727).

In 1979, he became manager of the system and software team (some 15 engineers whose number was increased to 27--20 for software and 7 for the system) which, in collaboration with German engineers from UDO, in Frankfort, designed the new Airbus instrument panels.

"On the Airbus 310 (introduced in 1979, certified in 1983)," he indicated right away, "innovations had been deliberately limited to quasi-artisan production, with no sophisticated software tools. On the contrary, the Airbus 320 instrument panels will really make a difference. More complete, more compact... they cover the essential parameters required for navigation and aircraft steering."

The EIS, Electronic Instrument System, consists of six high-definition Shadow-Mask color tubes, two on the left for the chief pilot, two on the right for the copilot and two in the middle for guidance and monitoring. Three computers work in the wings. Each of them (six 68000 processors per unit) can send display orders to three different tubes.

One of the three installed computers is a hot standby ready to take over at any time. Using various configurations, it is also possible to transfer an image from one screen to another in the same screen group.

Let's assume we are in the chief pilot's seat. "Please fasten your seat belts!" In front of him, apart from a few remaining traditional indicators, there are two screens (two identical screens are in front of the copilot).

The left-hand screen is dedicated to steering; in avionics parlance it is the "PFD" (Primary Flight Display). It is used to make turns, to take off and to land. In the middle of the screen, the roll is indicated (i.e. the pitch with respect to the lengthwise attitude); lower down, the heading information scale; left, the speed scale with the Mach number; right, the pressure altitude and the climbing speed; at the top of the screen, finally, the engaged autopilot modes.

The right-hand screen (same size: about 18 cm x 18 cm) is dedicated to navigation, it is the "ND" (Navigation Display). The heading information scale is at the top of the screen on which the aircraft (shown in yellow on the screen) can be monitored continuously, and the flight plan (represented by a white line) followed. Superimposed on them, the Airbus radar draws the weather map and its cloud masses; those that must be avoided are in red.

In the four corners of the screen, we can see the position of the next geographic beacon and the number of nautical miles to cover, the air speed (if there is a carrier wind), the direction of the wind and the orientation of the aircraft weather antenna.

In the middle of the instrument panel, two more screens of identical size are placed one above the other. The top one gives the engine parameters and the alarm signal. The speed, temperature, mass fuel rate of flow, tank fuel weights, total fuel load, the lift conditions of leading edges and flaps as well as a number of other indications (deicing, etc.). In case of alarm, the letters change color.

The lower screen provides information on the electric and hydraulic systems, the air conditioning, door locks, fuel supply, generator control, oil quantity and pressure... all things that were the province of the flight engineer in airplanes of yesteryear.

It took four years to develop the software used by the (less sophisticated) Airbus 310 system. The new program at Thomson is scheduled to last one year less.

A 3-Year Battle Plan

Evelyne Durgeat, 34, an IDN engineerin, had her first experience of scientific computation with offshore oil platforms; she was hired by Thomson in 1979. She is heading the software team and here is her battle plan for the next few years: "The first version of a specification was filed this year in spring. It will reach the Aerospatiale laboratories during the first quarter of 1986. The second version will be ready by mid-1986 for ground testing of a prototype aircraft."

"Late in 1986, the third stage will see the transfer of three Thomson engineers to Aerospatiale. By then, time will be irreducible. If there are delays, four or five engineers will be transferred. We will make it up with the staff size..."

"For the A.310," she indicated, "we already had a whole logic sum for alarm messages. We kept part of it in assembly language. Then we created logic and digital macrofunctions."

Software tools fall into two categories: the core with traditional services (monitor, integrated self-test, maintenance software) and the display with a workshop running under Unix. Automation is achieved through a system of articulated lattice generation and high-level language texts, the Sygaret. Also note the management of modes and parameters achieved in Pascal, as for the core.

A team not involved in development helps with a few key stages in order to ensure that the security level is adequate. Simultaneous control and monitoring errors must be avoided at all costs. All updating of the documentation is done simultaneously. The software documentation manual alone is already expected to include 5,000 pages.

It is still too soon to say if the fate of the Airbus 320 will be as happy as that of its elders. Competitors, mostly from the United States, are emerging

(Collins is the first, then RCA, Bendix, Sperry, etc.). In France, Sfena alone has the potential to embark on such a venture.

At any rate, Thomson-CSF has a chance as far as flight displays for all types of aircraft flight compartments are concerned. Thus, the new Mirage of Dassault will include a screen that will superimpress tactical orders on the database maps.

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COMPUTERS

GMD OF FRG DESCRIBES AI, EXPERT SYSTEM RESEARCH

Munich COMPUTERWOCHE in German 1 Nov 85 p 58

[Article: "GMD (Gesellschaft fuer Mathematik und Datenverarbeitung MBH): KI Research Strives for Practical Use"; first paragraph is introduction]

[Text] The GMD (Gesellschaft fuer Mathematik und Datenverarbeitung MBH [Company for Mathematics and Data Processing MBH]) is represented by six exhibits at the systems show. On exhibit are projects in the area of expert systems, the SNA-PAD system, the Transport Optimalization Program (TOP), the "Pindar" form-oriented interactive data base system and the "PAG" prototype output generator.

One example from the labors of GMD is the "Babylon" software tool, an expert system for the production of expert systems. "Babylon" constitutes an integrated, high-level work environment for the information engineer, who must put the knowledge of the expert into a form that is understandable to the system. The "DEX.C3" expert system for the diagnosis of defects in the automatic gears of motor vehicles provides an example of another focal point of activities at GMD. "DEX.C3" illustrates the mode of operation and the performance potential of expert systems through a practical application. It was developed through cooperation with Ford Europa for gears of the C3 model.

Important extensions to display units connected to IBM large computer systems are provided by the SNA-PAD system (Systems Network Architecture-Packet Assembly/Disassembly) by GMD, which was developed on commission to the Verein zur Foerderung eines Deutschen Forschungsnetzes [Association for the Promotion of a German Research Network]. It makes possible safe and rapid communication with large computer systems as if the display unit were connected to the other system. In this way, users have the opportunity to access public and private information services, mailboxes or other data processing systems from their own display units without having to work their way through from system to system, or from network to network.

In technical terms, SNA-PAD emulates the functions of a "Packet Assembly/Disassembly" device (CCITT X.3) for all terminals working with TSO [time-sharing option]. It thus opens up access to all systems that are connected to a public network with CCITT X.29.

The TOP Transport Optimalization Program is a flexible data processing program for transport optimalization. This optimalization is from a cost standpoint. The decisive aspect in TOP is that use is not made of the strategy of minimalization of road surface but rather the strategy of minimalization of resources. The program is suitable both for long-term transport analyses, transport simulation and strategic planning and for calculating supply transportation that changes on a daily basis.

Improvements in the application of data base systems are provided by the "Pindar" form-oriented interactive data base system, developed by GMD. In its performance spectrum it covers all areas of acquisition, maintenance and correction as well as enquiry and retrieval, in addition to print editing and data output.

The PAG prototype output generator was also developed by GMD on the basis of a document model, and implemented in a initial version in the "Pindar" data base system. It supports the creation of tables and text in page format, and it differs from other output systems in particular in its combination of the capabilities of a report generator and of a formator. It is expected that an independent output generator will be developed based on experience with this system.

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CSO: 3698/237

COMPUTERS

EUROPE-WIDE PROJECT EJOB RESEARCHES OPTICAL COMPUTER

Duesseldorf VDI NACHRICHTEN in German 18 Oct 85 p 42

[Article: "EEC Promotes Work on Optical Computer: Europe Equal to US in Research"]

[Excerpts] Within the framework of an EEC plan to stimulate cooperation in the area of science and technology, the EEC Commission with funding of 1.8 million currency units has created an international consortium consisting of 19 scientific teams at 18 universities and research institutes to develop an "optical computer." In contrast to our current computer facilities, "optical computers" can clear technological hurdles. Instead of operating with electrons, they would work with light, with photons, which are must faster.

None of the scientists currently involved in the cooperative EEC project to research "Optical Bistability"--within the framework of projects to stimulate research and development in Europe--has made any definite statement on the project. The "European Joint Optical Bistability Project," abbreviated EJOB, is supposed to conduct research on the basic scientific principles required to build an optical computer. It is still too early to make assumptions on broader technological application based on successful experiments. At this point it is not even certain what materials are sufficiently durable and applicable. Mathematicians have only just begun to think through the basic principles for parallel data processing.

The results of the cooperative research which has just begun could constitute the basis for future optical computers. Numerous experiments indicate that the project is doable.

European manufacturers of data processing equipment have not expressed themselves on the subject yet. As yet they have no concept of how they might have to work or with what procedures. To be sure, they foresee that the technical shift to optical bistable circuit components would open up a direct route into the so-called fifth computer generation.

Research results up until now indicate, however, that the optical computer would be very much like electronic computers. Optical bistable circuits

correspond to transistors, printed conductors are analogous to light rays. The analogy gives the scientists the hope that the optical computer will be relatively "easy" to create with reference to electronic data processing equipment.

Consequently, the eight European labs and scientific teams working together on the EJOB project want to have come far enough already in two years, 1987, that they can discuss the practical possibility for creating the most important component, an "optical processor." Until then, the prerequisites are supposed to be worked out through as many supportive experiments as possible. This includes answers or indications of possible solutions to important problems:

- What should the structure and "architecture" of an integrated, optical circuit be like?
- Which crystaline materials possess the best optical bistable characteristic?
- Which lasers are suitable, and in what wave lengths?
- How fast should the optical circuits work, and at what light intensities?
- How should optical processors work, and at what clock speed?
- How can an optical computer be connected with the "outside world" for data input and output?

Without clearing up these and other problematic details, they can't start work on designing and building the first circuit components.

The behavior of light is more versatile than that of electrons. It vibrates in distinguishable frequencies and phases. It acts like waves or particles. Hence light can also be utilized in more versatile ways than electrical current. This will be an advantage for the optical computer.

But the engineering application of these concepts is not as easy as it sounds. Many detailed questions have to be clarified and tested first. The job distribution within the EJOB project reflects this fact. For instance, they are continually looking for additional materials which exhibit non-linear, optical behavior. They are concerned with developing new laser diodes for infrared light. Data input, for instance, could conceivably be achieved using the radiation pressure from laser light on movable mirrors.

Data storage is also important for the design of optical processors. Image discs could be considered for mass storage. According to current conceptions, they would convert light impulses into electronic impulses. It may be possible to avoid this kind of conversion. It may be that we can continue to use a number of current electronic solutions. This might mean that optical computers could be combined with electronic computers to form so-called hybrid computers.

Although American physicists began studying the phenomenon of optical bistability earlier than their European colleagues, there is almost a "continental equivalence" at this point in time. The reason for this is that Scottish researchers under Desmond Smith were able to convince the EEC Commission to take up the EJOB project as a total European activity.

At the present time 19 teams at 18 universities or research institutes are working in close mutual cooperation with each other on all the questions having to do with optical computers.

Each individual contributes the results of his own research work to the common goal. On the other hand, the EJOB project is not comparable to the research support in the United STates or in Japan.

EJOB cooperative European scientific effort is being supported by the EEC with about 1.8 million ECU.

While the work on the optical computer is still in the basic research stage, research on organic molecules is already producing successes. At the University of Durham (Great Britain) scientists service a trough in which alternating layers of various molecules are generated. Within the framework of this process, a selected material is drawn through the fluid-filled trough and a film is formed on the material. In this manner, the team under Professor Gareth Roberts has, among other things, developed a super-fast switch with a response time in nano-seconds (a nano-second is a billionth of a second). LED's can be improved by a factor of more than 12, and solar energy cells by up to 50%. These components withstand temperatures up to 400°C, stick like leaches, and don't suffer adverse functional effects by being exposed to very bright light. The first application for the new process will be the production of field effect transistors (FET's). Bio-FET's are biological membranes with which the effect of narcotics or changes in the blood or gas composition can be monitored; pyro-FET's respond to temperature changes and can be used in conjunction with thermal imaging equipment; piezo-FET's are pressure sensitive and consequently ideal for hydrophones.

13127
CSO: 3698/214

COMPUTERS

SIEMENS REVAMPS SERIES 7500 TOP-OF-LINE COMPUTERS

Paris ZERO UN INFORMATIQUE HEBDO in French 21 Oct 85 p 13

[Article signed G.S.: "Competing With the IBM 43XX and 30XX, Siemens Is Revamping Its 7500 Line"]

[Text] With 11 new UC 7500 and one PC running under BS-2000, the German group is completely restructuring its computer line and asserts itself as the only European manufacturer capable of facing IBM with a homogeneous line.

On 7 October in Zurich, Siemens made a series of announcements said to be "the most important in its history." Judge for yourself: 11 new 7500 central processing units, from model 7530-C with 0.35 Mips [millions of instructions per second] to model 7590-R with 27 Mips, thus raising from 1 to 80 the power ratio of the whole line under BS-2000 (which now consists of 22 models); one micro, the PC 2000, running under both BS-2000 and Sinix; two 32-bit supermicros, the PC-MX2 and MX4; and a new graphics station referenced 9732-1 for 3D applications.

Depending on their type, all these machines will become available between next December and the first quarter of 1986, except for model 7590-R which willbe delivered in 1987.

The new models of line 7500 fall into several categories.

Series 7590, representing the very top of the line, consists of two models: the 7590-G single-processor unit, and the 7590-R dual-processor unit, respectively credited with powers of 15 and 27 Mips and competing with the IBM 3081-KX and the IBM 3090-200, respectively.

Series 7580 consists of four central units denominated D, E, I (single-processor units) and S (dual-processor unit) whose power range (from 3.4 to 11 Mips) covers that of the IBM 3083-EX to 3081-GX.

As for series 7560, it includes three single-processor models, E, F and H, offering from 1.3 to 3.1 Mips and thus falling into the area covered by the 4341-2 and 12 and the 3083-CX.

Finally, the already existing series 7530 receives two additional models, the 7530-C rated at 0.35 Mips and the 7530-H estimated at 1.2 Mips.

With these announcements, Siemens thus consolidates the low (7530) and intermediate levels of the 7500 line, with a series 7560 being added between the 7550 (three models, B, D and N) and the 7570 (four models, B, C, G and P) announced in October 1983.

But, above all, the German manufacturer is thus providing this line with the high-end and very-high-end levels 7580 and 7590, the latter also intended, in certain respects, to bridge the gap with the 7800 series of Fujitsu origin (although under BS-2000, the 7590 models derived from the 7890 still use the IBM interface to connect to peripherals).

Siemens is thus now in a position to offer a deeply enhanced line that will make up the essence of its output and its strategy in years to come.

Apart from these power concepts, the new machines still embody the general principles of the 7500 line:

- As far as software is concerned, the BS-2000 operating system remains unique to all of the 22 models now making up the line. As is known, this is a highly interactive oriented multivirtual operating system whose new versions, introduced on the same occasion, can manage several hundreds of simultaneous users' tasks.

- As far as hardware is concerned, the new 7500 models continue the technological enhancements started two years ago when the 7550 and 7570 were announced: MOS [metal-oxide semiconductor] memory technology using 256-Kbit chips, and ECL/LSI [emitter-coupled logic/large-scale integration] modules offering from 700 gates per chip (on models 7530) to 13,000 gates on the 7590, with transit times ranging from 0.9 nanosecond to 350 picoseconds.

In this field, Siemens ranks among the most advanced manufacturers. The reason is that it has full control over the design and fabrication of its circuits.

- As far as architecture is concerned, finally, except for the 7530-C, all new models have a cache memory and their operation includes a pipeline mode with up to six overlapping levels.

Characteristics of the New 7500 High-End Models

7590 Models	7590-G	7590-R
Main memory (megabytes*)	14 to 64	32 to 128
Main cache memory (kilobytes*)	512	2 x 512
Private cache memory (kilobytes*)	23	46
Low-speed channels (maximum number)	23	46
High-speed channels (maximum number)	6	12
Input/output transfer rate (megabytes/second)	72	144

7580 Models	7580-D	7580-E	7580-I	7580-S
Main memory (megabytes*)	8 to 32	8 to 32	16 to 64	32 to 128
Write buffer (kilobytes*)		8	8	
Private memory (kilobytes*)			256	2 x 256
Private cache memory (kilobytes*)	64	64	64	2 x 64
Low-speed channels (with 8 ports)	1	1	1	1
High-speed channels (with 2 ports)	3	3	3	3
Input/output transfer rate (megabytes*/second)		16/32		32/64

[* 8-bit bytes]

The main characteristics of the new models are shown in the tables above.

Apart from the announcement concerning the 7500 series, Siemens is also introducing the PC 2000, a multi-station (up to six) "dual-micro" that can operate as a stand-alone, in a network, or as a decentralization station for 7500 central-site applications.

Built around a Siemens-made processor and an NS 32016, it can actually run both under BS-2000 and under Sinix (the Siemens version of Xenix 3.0). In the standard configuration, the PC 2000 comes with 1 megabyte [8-bit bytes] of memory and a 650 kilobyte diskette unit, and can support up to six work stations.

In addition, Siemens is introducing two 16/32-bit supermicros operating solely under Sinix and designed more particularly for the technical and scientific applications markets. Built around the NS 32016, and offering memory capacities of respectively 1-4 and 2-4 megabytes [8-bit bytes], the PC-MX2 and PC-MX4 will accept, the former up to 6 work stations, and the latter up to 16.

Finally, Siemens also announced its 9732-1 graphics station, based on the PC-MX2, which, when connected to a central computer, is suitable for the development of 3D Sicad/Cadis graphics applications.

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COMPUTERS

BRIEFS

FRENCH ARTIFICIAL INTELLIGENCE MACHINE--Slowly but surely, the Maia machine is making headway. Begun two years ago, the CGE-developed Lisp and Prolog machine will enter the industrialization phase in November as scheduled at the Amaia company. Two prototypes are already in operation, one at the CNET and the other at CGE. Project managers hope to show the first production model at the next Sicob. Performance should be similar to that of the Symbolics Lisp machine, i.e., around 50 times faster than a Vax for Lisp programs. This 40-bit-word single-user design is a multitasking machine, intended particularly for intelligent process control. It has an impressive 80 MB of central memory [as published--title indicates only 2 MB of RAM]. The CPU board is no less astonishing with its approximately 800 packages. [Text] [Paris INDUSTRIES ET TECHNIQUES in French Nov 1 85 p 9] 13014/12913

EUREKA EXPERT SYSTEM FOR THREATS--AEROSPATIALE, CAP GEMINI SOGETI and DET NORSKE VERITAS have announced that they will work together within the framework of the European high-technology program Eureka to create the "MENTOR" expert system, a computerized decision-making tool. In a press release published in Paris on October 30, the three companies stated that this expert system would specialize in "real-time threat assessment." Their definition of "threat" is quite broad. According to the press release, the system could be used in applications as diverse as "peaceful defense," management of complex industrial plants, bank transaction security, and medical supervision. The machine, designed and programmed especially for this type of use, "should give rise to an analysis system with the ability to learn and adapt in order to provide decision makers with a composite picture of the situation and the best possible advice at all times." By choice, the partners in the creation of this risk-prediction and crisis-management tool are complementary. AEROSPATIALE runs complex aeronautical, military and space programs; CAP GEMINI SOGETI is a leader in computer information sevices; and DET NORSKE VERITAS is a certification company. The partners indicate that they may be joined at a late date by Eruopean reinsurance companies. [Text] [Paris AFP SCIENCES in French Oct 31 pp 14-15] 13014/12913

FRANCE-SINGAPORE ARTIFICIAL INTELLIGENCE--France and Singapore will create a joint artificial intelligence laboratory in Singapore next year, the French ambassador, Mr Jacques Berniere, announced on 27 November. Mr Berniere announced this creation during a seminar on artificial vision and intelligence organized at the France-Singapore electrotechnology institute and attended by representatives of several French companies and research centers, including the research center that was at the origin of the Prolog language used for fifth-generation computers. The ambassador also announced the donation of laboratory equipment worth U.S.$71,000 to a joint institute that was created by the two countries in 1983 to train technicians. The institute is planning to offer courses on artificial intelligence and vision starting in 1987, in addition to the course on robotics, microelectronics and computer-aided design (CAD) that it is already offering. [Text] [Paris AFP SCIENCES in French 28 Nov 85 p 38] 9294

ERLANGEN DEVELOPS 'SUPER COMPUTER'--Fuerth--One of the most extensive multiprocessor facilities in the world has gone into operation in Erlangen. The "DIRMU 25" data processing facility, consisting of 25 processors, was developed in the Institute for Computer Science at the University of Erlangen-Nuremberg and built in our [Siemens'] Nuremberg affiliate's workshop operations in Fuerth. Wolfgang Haendler, head of the institute, explained that since even the so-called super computers are inadequate to handle many modern engineering assignments, it has been a goal of the Erlangen computer specialists to have the computers work as a team. In this manner, it is not only possible to increase computer speed significantly, but one can also develop the software and hardware in such a way that the equipment not only recognizes errors during operation, but can also eliminate them. For instance, if a memory [unit] fails, first a diagnosis program and then a repair program are triggered. [Article from Fuerth: "University with Super Computer"] [Text] [Munich SIEMENS MITTEILUNGEN in German Oct 85 p 11] 13127

CSO: 3698/214

DEFENSE INDUSTRIES

BRIEFS

UK-FRG LASER GYROSCOPE--The systems and electronic equipment division of British Aerospace and the German company Teldix have decided to cooperate in attempting to gain a significant portion of the laser gyroscope inertial navigational systems market, announced a joint press release. The market represents approximately 100 million pounds, of which the new European fighter comprises the major portion. The systems and electronic equipment division of British Aerospace perfected the first British laser inertial navigation system in 1981 and they were subsequently given the contract for manufacturing the laser navigation systems for the Anglo-Italian EH 101 helicopter. Teldix Gmbh, a subsidiary of the Bosch group, produces navigation gyroscopes, computers, and display devices and is developing the laser gyroscope and inertial navigation systems with research subsidies from the German government. This agreement is entirely consistent with the policies of close cooperation on military projects of the British and German governments. The agreement provides that the jointly developed systems will be manufactured in Great Britain and in the FRG or in the two countries at the same time, depending on the needs of the programs. [Text] [Paris AFP SCIENCES in French 28 Nov 85 p 87] 13146/12859

CSO: 3698/198

FACTORY AUTOMATION

SIEMENS, ITALIAN FIRM TO COOPERATE IN NC DEVICES

Landsberg PRODUKTION in German 26 Sep 85 p 1

[Article by hy.: "New Strategy: Siemens to Cooperate through Minority Ownership--Open to All Forms of Cooperation"]

[Text] Hannover. From now on, the E.C.S. Electronic Control Systems S.p.A. of Florence and the Siemens company will cooperate in the field of numerical controls for machine tools and in industrial automation. The new Siemens strategy is significant; the Erlangen people are satisfied with 49 percent of the new capital stock of the Italian firm.

According to engineer Dr. Guiseppe Tarassi, Commercial Director, the Italian company E.C.S. considers itself "...the market leader in Italy as NC manufacturer with a 35 to 40 percent market share." Since its establishment 15 years ago the 200 employee firm has developed into the most potent partner of the Italian machine tool industry with additional strong activities in France and Spain.

The German E.C.S. headed by Wilfried Emig considers itself above all as a mediator for users of Italian machine tools in this country; i.e. service and back-up in the technical and language fields. All necessary maintenance work and customer support is handled from Stuttgart.

According to graduated engineer Guenter Stephan, head of the business section production automation and automation systems of Siemens Italy both firms have proved in the past that they are capable of offering successful solutions for complex tasks in production automation. Stephan: "The cooperation is intended to strengthen these facts."

As graduated engineer Manfred von Raven, "Prokurist" [a person having been granted full power of attorney by his company to conduct business] at Siemens Erlangen in the same business section as Stephan adds: "Siemens as the leading partner in this cooperation came up with the idea to conduct production automation as a global business." And that is why Italy, too, belongs to the European i.e., to Siemens' own market. Von Raven: "Our minority participation--undoubtedly an experiment for us--is meant to maintain the dynamics of E.C.S., indeed, it is intended to be fully put to use for both of us."

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FACTORY AUTOMATION

BRIEFS

RENAULT FLEXIBLE WORKSHOP FOR SNECMA--Renault Automation has just signed a contract with SNECMA [National Company for Study and Construction of Aircraft Engines] to install a flexible workshop at Creusot to machine turbine disks for various military and civilian jet engines. The overall contract amounts to 56 million francs for Renault Automation, or one half the total investment in the workshop. Work began last December, and the first pieces are scheduled off the production lines by mid 1987 with the "turnkey" workshop being delivered in May 1988. [Text] [Paris FIGARO ECONOMIE in French 27 Jan 86 p 12]

CSO: 3698/288

MICROELECTRONICS

FRG SCIENTISTS ANALYZE INNARDS OF SUPERCONDUCTING COMPONENTS

Duesseldorf VDI NACHRICHTEN in German 1 Nov 85 p 26

[Excerpts] A process whereby for the first time superconducting components can be analyzed according to their internal characteristics has been developed by experimental physicist Prof Rudolf Huebener and his coworkers at the University of Tuebingen.

As Professor Huebener said in presenting the process during a symposium, he and his coworkers link the new low-temperature electronic system of measurement with a scanning electron microscope. This makes possible the analysis of the superconducting components up to a thousandth of a millimeter. According to his statements, these components are used in new electronic systems of measurement that function at a temperature of minus 270 degrees Celsius. Thus, this makes possible electrical and magnetic readings of the greatest sensitivity with much greater precision than that of all previous processes and results.

In the meantime, this method is reportedly already being used in medicine for measuring magnetic signals from the brain. In this way, abnormalities in the brain can be diagnosed through magnetic probes on the head without an operation and without side effects. The decisive factor in this is that changes in the brain be precisely localized and that surgeons be given a clear idea of whether, where and how an operation should be undertaken. However, the potential applications are reportedly quite extensive, for example in the field of materials or in determining voltage standards by the bureau of standards.

The Tuebingen physicists are currently working on the further development of the method and are looking for materials for which such low temperatures are not necessary, so that their process could then become considerably less expensive. The research is being financed by the Volkswagen Foundation and the German Research Community (DFG).

12271
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MICROELECTRONICS

MICROSTRUCTURE TECHNOLOGY WORK AT FRG FRAUNHOFER INSTITUTE

Duesseldorf WIRTSCHAFTSWOCHE in German 8 Nov 85 pp 132, 135

[Excerpts] Mechanical science faces an undreamt-of renaissance. Microelectronics makes it possible to go beyond the present limits of miniaturization.

For years, the department for microstructure technology of the Munich Fraunhofer Institute for Solid State Technology in Berlin has been concentrating on micromechanics. A first large research project, supported by the Federal Ministry for Research and Technology (BMFT) planned the development of inexpensive mini-sensors, which are a basic prerequisite for a future broader application of microelectronics in the measuring, control and regulating technology. The fact is that at present microelectronics unfortunately is still suffering from a grotesque imbalance: while the integrated circuits and storage elements become ever smaller and cheaper, the peripherals--from sensors providing measured values to the actuators such as valves which translate computer commands into action--are lagging behind by being bulky and expensive.

To form structures of a few micrometers, i.e. a few thousands of a millimeter, the Berlin researchers, but also United States researchers from the Stanford University and the research centers of RCA and IBM went back to lithography, masking and etching technologies which have proved themselves in electronics. And they used above all materials they were familiar with--in particular the semiconductor silicon.

For certain silicon crystals the etching processes take place quickly or slowly depending at which crystal axis the etching agent attacks. This method makes it possible to produce very specifically the minutest structures, at the most thousands of a millimeter wide and thick: tongues, spirals or grids which are not larger than the head of a pin.

Thus, the Berlin researchers of the Fraunhofer Institute developed a test structure the size of which is hardly imaginable any more: the silicon element contains a groove which is one millimeter long, .3 millimeter wide and 20 micrometers deep. Across the groove 18 free-standing tongues were etched,

40 to 200 micrometers long, 20 micrometers wide and only two micrometers thick. As a comparison: the semiconductor structures of the most modern electronic storage elements also measure only 1.5 to 2 micrometers.

These fine structures are not visible to the bare eye, not even under the microscope. If you want to see them you must use a scanning electron microscope which enlarges several hundred to thousand times to perhaps recognize on patterns of micromechanical elements either an angular sprial held only on one side whose three windings when pulled apart only manage to show a length of 5 millimeters. Other patterns show spirals held at two sides with small circular plates in the center which spring back up to .3 mm when forces act upon them.

These mechanical midgets can be used in many ways: To mesure vibrations, shocks, and accelerations of microscopically small, point-shaped microphones. However, humidity can also be measured on sensitive microtongues if a coating is applied the length of which changes with humidity and thus bends the tongue. Despite their minuteness the microstructures have a high mechanical stability. They are able, for instance, to monitor vehicles as knock and crash sensors, to control liquid or gas jets as electrically and thermally activated microvalves in ink jet printers and gas chromatographs as well as to modulate light in optical communications systems. Further applications can be found not only in aeronautics and space flight, but also in medicine where micro blood pressure meters have already been inserted directly into one of the arteries or into the heart.

And when the extremely delicate and thin silicon membranes were successfully coated with gas absorbent metal films or resistor paths, microelements were at hand which were able to measure gas and liquid flows as well as gas concentrations and which were also able to determine the composition of fluids.

12831
CSO: 3698/151

MICROELECTRONICS

DAIMLER ANNOUNCES 'PROMETHEUS' EUREKA PROGRAM

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 3 Dec 85 p 5

[Text] Paris (AFP)--Daimler-Benz AG, Stuttgart, the German automobile concern, announced a research project under the European Eureka Program which is supposed to lead to practically accident-free traffic. As stated by managing board member Rudolf Hoernig, in Paris, the project bears the name "Prometheus." It stands for "Program for a European traffic redesign with highest efficiency and unlimited safety." What is involved are new information, control and regulating systems in which new technical developments in the fields of microelectronics and sensor technique could be used. According to Hoernig, what is involved here is the development of a vehicle that moves fully automatically, development of a communications network between vehicles which permits driving by electrical display as well as the development of a communications and information system between vehicles and their environment. In this connection, e.g., information on the traffic situation could be disseminated by satellite communications. Hoernig stressed that all competent European enterprises have been invited to collaborate on "Prometheus." Talks are said to have already been held on coordination of research work with the French Matra concern.

12356
CSO: 3698/254

MICROELECTRONICS

SIEMENS, PHILIPS RECEIVE GOVERNMENT FUNDING FOR MEGAPROJECT

Duesseldorf HANDELSBLATT in German 9 Dec 85 p 19

[Text] Bonn, 12/7&8/1985--Siemens-Philips: The first samples of the new 4-megabit chip are supposed to be shipped in 1988. The total costs of the project are indicated at 1.4 billion DM.

The governments of the Federal Republic and The Netherlands have agreed to provide massive government funding in support of development cooperation between Siemens and Philips in the area of electronic chip technology. The Federal Government will pay a total of 320 Mill. DM in 1985-1988, Holland 160 Mill. The funding appropriations were issued over the weekend.

The appropriation is supposed to underline the political desire to capture a chance in a market that is currently dominated by the Japanese. The project in question involves the development and manufacture of so-called 1-megabit and 4-megabit computer memory chips. Total development costs for the German-Dutch project are indicated at 1.4 billion DM. About 30% of these costs will be subsidized by the governments.

The first samples of the new 4-megabit chip are supposed to be shipped in 1988 and will go into production in 1989. If the time schedules can't be met, the Federal Ministry for Research and Technology has reserved the right to end the project ahead of time. In the event that Siemens should expand its existing cooperation in other areas with the Japanese company Toshiba to the megabit project, they have the contractual obligation to pay back the subsidy.

In addition to the 1.4 billion DM research expenditure, the megabit project will result in 1.5 billion DM worth of investments, broken down to 1 billion DM in the Federal Republic and 500 million DM in The Netherlands. Consequently the companies involved are taking a high risk if they miss their target, which is to bring the 4-megabit chip on the market at the same time the leading Japanese manufacturers do, who are also talking about 1988.

Siemens and Philips have committed themselves to their governments to build three production facilities toward the end of their research work, one plant in The Netherlands and two in the Federal Republic, one near Hamburg, and the other in Regensburg.

The work distribution plans for Siemens to develop the 4-megabit chip and Philips the 1-megabit chip. The 4-megabit chip is a dynamic memory chip and the 1-megabit chip is a static chip. Both exhibit the same degree of complexity and impose the same requirements on the process engineers.

The structural dimensions of these chips will be 0.7 µm.

Since the entire project will require an expenditure of manpower equivalent to 2,000 so-called man-years, it would be impossible for one company to undertake the development alone. Consequently Siemens and Philips (with its German subsidiary Valvo) have decided to work together to develop the memory chips and to combine their personnel capacities. To take care of the project they have already created a control committee representing leading employees from Philips, Valvo and Siemens. There is a joint work schedule for the project, and both companies will exchange engineering documents with each other.

The first phase, during which preliminary work was done and a detailed work schedule was worked out, has already been subsidized by the Bonn Research Ministry to the tune of 7.9 Mill. DM. The entire project is divided into four sectors: Technology, Design, CAD and Manufacturing Engineering. The mutual work schedule includes about 400 job packages.

A cooperative group of experts, made up of German and Dutch specialists who will advise both governments, has been put together in order to evaluate the progress of the megabit project.

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MICROELECTRONICS

PHILIPS ANNOUNCES PROFITS, PERSONNEL TRENDS FOR 1985

Rotterdam NRC HANDELSBLAD in Dutch 10 Jan 86 p 11

[Article by ANP]

[Text] "The turnover of Philips rose in 1985 to nearly 60 billion guilders. That is 6 billion guilders more than the previous year. The profit margin, however, is lower than in 1984, particularly because the United States has lagged behind in turnover and profits." This statement was made by the president of Philips, Dr. W. Dekker, in his New Year's statement.

Dekker concludes that Philips is still far from the end of its repertoire. "With the same number of personnel, we have achieved an increase in turnover of 6 billion guilders. That is equivalent to the total turnover of a company such as the KLM."

In 1984, the profits of Philips amounted to 1.1 billion guilders. It was endeavored to achieve a 25 percent increase in profits in 1985. According to Dekker, the exact margin of profit is not yet known. Philips is still aiming at a turnover of 90 billion guilders and a profit margin after taxes of 3 to 4 percent (2.7 to 3.6 billion guilders) of that amount in 1991. That year, the enterprise will have been in existence for 100 years.

According to Dekker, the increase in turnover last year was achieved despite the drastic decline in the U.S. market for integrated circuits and consumer electronics. Also the exchange fluctuations, especially the decline of the U.S. dollar, cost Philips a lot of money.

The supply level, which in 1984 still constituted a major problem, dropped by 3 percent. It is true that declining currency rates account for 2 percent of this drop, but, in terms of money, 600 million guilders still remain over. "And such a drop in supplies means a drop in supply costs by roughly 100 million guilders. That is a gratifying aspect," says Dekker.

He is less satisfied with the profit margin, which is lower than expected. "It is, of course, gratifying that the declining trend in the rate of

profitability during the first 9 months of 1985 has been reversed during the last quarter."

Personnel

Dekker was also less satisfied with the personnel development, especially in Europe. The number of personnel has there declined less rapidly than agreed. In the United States, the number of staff members has dropped sharply. The total number of employees in Philips has, consequently, remained at almost the same level.

It should be possible to reach the target figures for turnover, says Dekker. "Between 1980 and 1985, Philips managed to achieve an increase in turnover of 65 percent. That should at least also be achieved during the coming 5 years." In order to achieve a profit margin of 3 to 4 percent, quite a few changes will have to take place in the organization. A profit margin of this magnitude is, according to Dekker, absolutely necessary to remain in existence in the long run.

According to the president of Philips, it will therefore be necessary for the employees to change their attitude. "The energy campaign, which has had the effect that we now save 200 million guilders annually in that sector, and the action to improve the quality prove that it is possible. We now also expect a similar change in attitude in other sectors. It is possible to make everything more efficient, with less people and a higher rate of productivity."

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MICROELECTRONICS

PHILIPS TO INCREASE PRESENCE IN JAPAN

Rotterdam NRC HANDELSBLAD in Dutch 14 Jan 86 p 11

[Article by Dick Wittenberg, editor]

[Text] Philips will start developing, asembling and manufacturing more articles on location in Japan. The company of Eindhoven finds that its position in Japan is "of vital importance to the entire concern." Philips is also considering increasing the knowledge of its name in Japan, for example, by allowing the Japanese subsidiary Marantz (audio) to operate under the Philips logo.

Philips is contemplating expanding its activities in Japan in the long run through cooperation with, or the takeover of, enterprises. H. Hoksbergen, director of Philips in Japan, made this statement yesterday.

According to Hoksbergen, all reports on the closed Japanese market are based on facts. The distribution network for consumer electronics, the bureaucratic import restrictions and the Japanese preference for national products largely controlled by Japanese manufacturers make it impossible for foreign enterprises to acquire a prominent position in Japan.

According to Hoksbergen, in view of the existing obstacles, Philips, however, has got no other choice but to make the best of it. "Philips must, indeed, be present in Japan since that country determines the trend in the area of consumer electronics," Hoksbergen said. "Japan sets the trend in this area, both in regard to technology and applications. Only by acquiring a substantial market share in Japan for all vital products will Philips be in a position to participate in this process. Only by producing on location will Philips be in a position to maintain the contacts with Japanese subcontractors which are necessary to keep abreast of future developments. We are not aiming at making a lot of money on consumer electronics in Japan. The position of Philips in Japan is primarily of strategic importance."

Market Share

At present, the Philips subsidiaries in Japan are only making coffee machines, shavers and audio equipment. According to Hoksbergen, the possibility of producing compact disc players and other products on the spot is being studied. Philips will thus invade the Japanse market with, among other things, an optic combination player designed for playing compact discs as well as for the video screen. Philips has already previously announced that Marantz will get a pilot factory for videorecorders. Philips is aiming at a market share for vital consumer products of 3 to 5 percent," Hoksbergen said.

Hoksbergen declined to discuss the amounts that the Dutch multinational concern will have left over to acquire a position in Japan. "We have no intention of making things easier for our Japanese competitors than they already are."

Cooperation

According to Hoksbergen, Philips already is tremendously popular in the area of certain professional products, such as medical electronics. He said that they are studying whether this position as well may be expanded by assembling in Japan.

Philips expects that the Japanese market for electronics, which last year already amounted to 140 billion guilders, will become six times as large over the next 10 years. In order to be able to participate in all areas in this growth, it will, according to Hoksbergen, become necessary to expand Philips' own organization. Philips will therefore have to resert to cooperations and acquisitions. Ever since the fifties the concern has had a joint venture with Matsushita in the area of light and electronic products. Last year, Philips announced the establishment of joint production with the Japanese enterprise Kyocera in the area of office automation and interactive systems for home use.

According to Philips, it will only now be possible to start invading the Japanse market. The matters first had to be arranged with Marantz, since the concern 5 years ago acquired a 50 percent proprietary interest. It is, moreover, extremely difficult for foreign enterprises in Japan to find qualified personnel, Hoksbergen said.

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MICROELECTRONICS

JAPANESE TO GET MEGAPROJECT RESEARCH RESULTS THROUGH PHILIPS

Rotterdam NRC HANDELSBLAD in Dutch 14 Jan 86 p 1

[Article by Dick Wittenberg, editor]

[Text] Via a joint venture with Philips, the Japanese concern Matsushita may acquire access to the results of the megachip project.

In this project, Philips develops a new generation of megachips in cooperation with the West German enterprise Siemens. This megabit project, which requires an investment of 1.5 billion guilders, is paid for 33 1/3 percent by the Dutch and West German authorities for the very purpose of supporting European enterprises in their struggle against the Japanese.

Matsushita and Philips have already been cooperating since 1952 in Matsushita Electronics Company (Mec), a Japanese producer of electronic components, lamps and screens. The Dutch concern has a share of 35 percent in this venture. According to J. Hillen, technical adviser of Philips at Mec, under the present agreement between the two concerns, all knowledge in the area of products and process technology shall be made freely available by either partner to the other after a period of 6 months.

The transfer of knowledge in the area of the 1-megabit chip will come up for discussion in the negotiations between Philips and Matsushita. The present agreement between the two concerns expires in 1987 and the talks on new conditions will start at the end of this year.

Mec is also doing research in the area of the 1-megabit static memory. According to A. Yoneda, director of Mec, they expect to start production in 2 years, one year earlier than Philips and Siemens.

According to the agreement between the two concerns, Philips has also after 6 months the right to the knowledge possessed by Mec. However, according to J. Hillen, in the development of the megabit chip, that would give little consolation. Even with all the knowledge available, Philips would still certainly need another 12 to 24 months to put the chip in production.

In its reaction so far, the Ministry of Economic Affairs says that the agreement between Philips and Matsushita will influence the support granted by the authorities. It is only of importance for the ministry that Philips acquires the technological knowledge. Last year, some dissatisfaction arose in West Germany within the Ministry of Research and Technology granting the support when it appeared that Siemens purchased part of the developed technology from the Japanese enterprise Toshiba.

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SCIENTIFIC AND INDUSTRIAL POLICY

COMMITTEE RECOMMENDS ESPRIT FUNDING THROUGH 1993

Paris AFP SCIENCES in French 28 Nov 85 pp 7-8

[Text] Paris--In a report addressed to the European Commission a group of independent experts is of the opinion that ESPRIT [European Strategic Program of Research and Development in the field of Information Technologies] should be continued through 1993 "if it is desired to achieve its ultimate strategic objectives" in information technologies and "consolidate trans-European cooperation".

During a press conference in Paris on 26 November, Mr Andre Danzin, member of the Evaluation Committee of the ESPRIT Program and former director of the French Thomson Group, recommended that Community credits be voted for a second five-year period (1989-1993) in order that this experiment be conducted over 10 years.

Mr. Danzin, one of the three members of the Evaluation Committee, also proposed associating other European countries with ESPRIT; namely, non-CEE members like Switzerland or Sweden. According to him, it "is too early to speak of the quality of the work which should lead to new products in 4 to 9 years". But already, he believes, ESPRIT has permitted "a reversal of mentalities".

The participants of the ESPRIT Program are satisfied with its "content and its equilibrium" according to a report covering the "intermediate evaluation of the ESPRIT Program" prepared by a group of experts mandated by the European Commission.

They think that ESPRIT "helps industry, universities and research institutes to perfect a technological base for the European industry" of data processing and electronics.

The criticisms concern the excessive number of partners in most of the projects and the burden of certain administrative formalities leading to requests for an acceleration of decisions and, above all, of payments, particularly by the PME and the university establishments.

The ESPRIT Program, adopted officially in February 1984, covers five main fields of endeavor:

-State-of-the-art microelectronics.
-Software engineering.
-Advanced processing of information.
-Office automation systems.
-Integrated production by computer (robotics).

Its credits, which amount to 1.5 billion ecus (half of which are allocated to CEE and the other half to the participants in the research projects) have been voted for a first five-year period (1984-1988).

At the end of 1985, nearly a thousand teams had been formed around the ESPRIT Program, including 650 in the industrial sector, 220 in "academic institutions" and 130 in research centers.

The concrete results of ESPRIT show the fulfillment of 95 contracts in 1985 on 385 applications, 110 contracts in 1984 on 441 applications and 36 contracts on 145 applications in 1983 in the pilot phase of the ESPRIT Program.

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SCIENTIFIC AND INDUSTRIAL POLICY

MONEY FOR FRENCH INDUSTRIAL MODERNIZATION FUND IN 1986

Paris AFP SCIENCES in French 28 Nov 85 pp 9-10

[Text[Paris--Speaking before the Council of ministers on 27 November, Mrs Edith Cresson, Minister of Industrial Redevelopment and Foreign Commerce, declared that FIM will be granted Fr 9 billion in 1986.

The following is the portion of the Council of Ministers statement devoted to this "essential instrument in the revival of industrial investment":

"The revival of industrial investment, which was very significant in 1984, continued in 1985. Its progress during these 2 years should exceed 16 percent by volume, whereas it was reduced by an average of 1.9 percent per year from 1974 to 1978 and 1.4 percent per year from 1979 to 1983. Thus, an end has been brought to the 10 years of under-investment which, since 1974 and the first oil crisis, had resulted in the aging of our production means."

"The creation of FIM at the end of 1983 has greatly contributed to this revival. During 1984 and the first nine months of 1985, this fund, fed by the Agency for Industrial Development (CODEVI), granted Fr 17.5 billion of participating loans and lend-lease to firms engaged in modernization programs."

"The FIM interventions have permitted the dissemination of new technologies and processes throughout industry, automation alone representing about two-thirds of the aid."

"A special effort was accorded in favor of small and medium-size businesses: more than 80 percent of the participating loan files concern firms having fewer than 500 employees and are processed at the regional level, the decision being made in particularly quick times. Furthermore, the FIM lend-lease procedure is becoming progressively a privileged instrument for the modernization of these small and medium-size businesses."

"In 1986, FIM will continue its mission and will contribute to the new priorities of the policy of industrial and technological development, such as the EUREKA project and the required accompaniment of the efforts undertaken in the industrial tertiary. To this end, the government decided to allocate an amount of Fr 9 billion for next year."

To the press Mrs Cresson pointed out that FIM 1986 has been increased by Fr one billion with respect to 1985. "There is no lessening of government action in the field of industrial investment," the minister emphasized, adding that "for the first time in 10 years," industrial investments will have increased in France during 2 consecutive years, in 1984 and 1985.

However, according to a community survey, industry investment in France is increasing less quickly in volume this year than in 1984 and is much below the increases presently observed in the Netherlands, West Germany and the United Kingdom.

Statistics of the Ministry of Industry indicate that the loans granted by FIM since its creation at the end of 1983 should reach a total of FR 19 billion at the end of this year and Fr 28 billion at the end of 1986.

According to Mrs Cresson, FIM has thus become "an indispensable instrument in the policy of industrial redevelopment," whereas "at Finances there are numerous eggheads who wish to abolish FIM," she said.

The minister hopes that more than half of the FIM loans, the interest rate of which is presently 8.75 percent, will go to the PME in 1986.

This year the Renault and Peugeot Automobile companies received Fr one billion of aid from FIM after having shared Fr 750 million in 1984.

When asked about the high portion of imported foreign machines resulting from the aid accorded by FIM to French firms, Mrs Cresson indicated that more than half of the automation equipment was of French origin.

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SCIENTIFIC AND INDUSTRIAL POLICY

CNR, IRI SIGN AGREEMENT ON S&T RESEARCH COOPERATION

Turin MEDIA DUEMILA in Italian No 11, Dec 85 pp 85-87

[Article by Alessandro Ovi entitled: "CNR and IRI Boost Research In Italy"]

[Text] Prof Luigi Rossi Bernardi, president of CNR, and Prof Romano Prodi, president of IRI, recently signed a general agreement to improve the link as well as the direct cooperation between CNR researchers and those working for IRI companies. The agreement clearly envisages cooperation based on three operational lines:

A) The statement of specific common research programs, which will also involve the universities;

B) The combined development of employees and structures belonging both to CNR and to the IRI companies;

C) The spur to the birth of both innovation centers and scientific and technological poles in Italy, which will be open to cooperation with other industries and research institutes.

This new agreement is the first step IRI wants to take toward the development of an efficient relationship between industrial and university research in Italy.

Experts often agree on the following point: The difficulty encountered in establishing the abovementioned relationship prevented the production process from achieving a fundamental contribution of know-how, human resources and innovation opportunities, which were often paralyzed and caught inside the structure of public research.

The development opportunities as well as the reaction skills of the Italian economic and enterprise system were badly affected by this situation. Moreover, they had to face the challenge of an international competition receiving its strength particularly from close relationships between research carried out in the universities and by the big public institutes, lifeblood for innovations.

Why does IRI think it is right and proper to deal with this problem together with CNR, which is the reference point of all Italian researchers? The answer to this question may be given bearing in mind two facts regarding IRI:

--The companies belonging to IRI spend for their many sections dealing with both research and development almost 1050 billion each year and they employ more than 11,000, that is, about a quarter of the Italian total [Table 1 and 2];

--These companies' research labs are spread all over Italy and have relationships with the main university research institute of the country [Table 3];

Given this situation it is logical to assume that well focused cooperation between CNR and IRI can contribute greatly to solve the problem of the difficult relationship between university and industrial research in Italy.

The Italian shortcomings concerning this fact are due to cultural as well as structural-normative reasons. The former cannot easily be overcome in the short term, even if the situation has remarkably changed since the early 1970's. Regarding the latter they can be dealt with even in the short term, bearing in mind the various characteristics related to research in different parts of the country.

The plan worked out by IRI and CNR requires the presence of an ad hoc structure in each place where they want to carry out their proposals. This structure should be given the opportunity to plan its own "scientific-technological" pole strictly combined with the local production world. It will be up to the Chambers of Commerce to narrow the gap.

A series of instruments devised by IRI and CNR in order to develop knowledge interchange between industrial and university research will be the common denominator for all. Therefore, IRI, CNR, and the local universities and the Chamber of Commerce have given an impetus to the birth of some associations in various Italian towns. Moreover, a useful and steady relationship will be possible between them and other local public as well as private institutions dealing with the research, training and technology transfer process. Associations like "Genoa Ricerche," "Milan Ricerche," "Trieste Ricerche," "Roma Ricerche," and "Catania Ricerche" are taking their first steps. Each of them will have to work out a plan aimed at fostering in its own area the cooperation between "university" and "industry" as well as at transferring results in innovation. After having first identified the common research opportunities and later devised how to let them interact, they will be active in the "territorial and urban" level in order to establish a "scientific as well as technological pole." It is as if the pole "software" aspect should come first and hence, steer its "hardware" aspect.

The association will have only a limited number of employees. At the beginning they will mainly carry out planning and promotion tasks supported by local employees and resources. The first structure they are going to plan in each town will be a center aimed at offering a series of services including the following:

--Revised information concerning the research being carried out in local research labs;

--Necessary assistance to those intending to cooperate with either universities or CNR for what concerns the agreement or the convention;

--Assistance in order to use public research financing [Law 46, CNR aimed plans, EEC, NATO funds and so forth];

--Assistance to new enterpreneurs dealing with advanced technologies;

--Know-how transfer to small and medium companies;

--Assistance to the employment of graduates as well as to future graduates in cooperation with high technology companies;

--Relationship with foreign institutions;

--Venture capital promotion.

Such structures, which will be developed and linked to the others planned in other areas [besides the first five we have already mentioned, negotiations are in progress with Turin, Bologna, Padova, Pisa, Bari and Naples], will also "physically" give birth to the scientific-technological poles. In spite of the differences caused by the fact that they are "local projects" they will have a common soul and moreover, they won't be just "poles" but "network junctions." In order for this to be accomplished, we obviously need strong university research, which will represent, according to its institutional task, an important quality reference point in the largest possible number of fields.

Experts are not interested exclusively in the birth of defined or given structures, such as the British-like "science parks, business and innovation centers" or more simply "liaison officers;" and they are not even concerned with a passive, semi-active or active transfer process.

The most important aim to be reached is the local selection of scientists, technology experts and managers foreseeing a remarkable goal on which to concentrate in the improvement of cooperation among researchers of different backgrounds, and they must feel, that being part of a network, is an opportunity and not an obligation.

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SCIENTIFIC AND INDUSTRIAL POLICY

CNR DEVELOPS PROGRAM FOR JOINT TECHNOLOGICAL COOPERATION

Turin MEDIA DUEMILA in Italian No 11, Dec 85 pp 101-104

[Article by Sisto Capri: "CNR Launches the Technological Stock Exchange"]

[Text] A brain "trust" covering most branches of scientific knowledge, from metrology to mechanics, from electronics to biology, from industrial sociology to geology and cosmosgeophysics. Four hundred people--engineers, research workers, hardware and software technicians, administrative employees and workmen--who have so far developed 160 projects, published 270 papers in different countries during 1984 and started to cooperate with 57 private firms. These few figures are just enough to illustrate what the National Research Council is and what it represents today, with its ramifications stretching over the "technological triangle" of Torino-Ivrea-Novara.

The CNR has decided to cooperate to make this capital of innovation--the most formidable concentration of robots, electronics and information processing companies, research and development institutions existing in Italy--become something qualitatively new, specifically a leading center of the "telescience revolution," a sort of mirror illuminating present and future scientific achievements applied to the change of products and production processes.

The ambitious but perfectly feasible program was illustrated on Friday, 15 November at Giovanni Agnelli Foundation by Prof Luigi Rossi Bernardi, the president of CNR, who is an outstanding research promoter in our country. The tasks entrusted 40 years ago to the Council and gradually updated are extensive: from the coordination of scientific activity to the setting up of laboratories, from the financing of research to the storing of scientific documentation and representation of Italy in the international technical and scientific institutions. Prof Rossi Bernardi was the guest of the Association for "Tecnocity" and spoke to representatives of the political and financial worlds.

"The research area of Mirafiori is at least starting to operate after years of a freeze in building," he said, adding that "this is one of the ten areas spotted throughout the country, the others already existing or about to be created located in Milan, Padua, Rome, Naples, Bari and Palermo. At Mirafiori, the 'Technological Stock Exchange for Industrial Automation' will start operating during the coming months. This center will be equipped with a

terminal connected with different data banks. A number of research workers will have the task of supplying to companies of any size and from any region detailed and updated information on research projects already completed or being developed, the know-how and who owns it, firm catalogs and notifications of grants."

The "automation section" will be integrated within the network of institutes and research centers that are organs of the CNR in Tecnocity and can be grouped into two poles, respectively, technological and agricultural-nutritional in nature. The first gathers the "Gustavo Colonnetti" Institute of Metrology (the center of the strategic program of certification and control, which recently signed an agreement with the U.S. National Bureau of Standards which identifies it as a depository of primary samples of measurement units); the Institute for Metallurgy; the Television Research Center, as well as the centers for the study of fluids mechanics, for numerical processing of signals (which carry out research work on simulation and identification of system on numerical computers, numeric filtering, analysis and automatic acknowledgement of the spoken language); the Study Center for Antennae Propagation; the Institute of Cosmos-geophysics (which in recent years has been conducting recording and analysis of gaseous and dust pollution of the atmosphere); and others. On the whole 246 people are working on 83 research projects and have published more than a hundred articles and set up cooperation programs with 28 industrial companies.

The second pole, the agricultural-nutritional one, includes the following bodies: Institute of Applied Phytovirology (which studies infections in the vegetable kingdom); the Center for the Study of Soil Mycology; those for the genetic improvement of the vine, for the feeding of animals; the Institute of Hydrobiology, and those for research and hydrogeologic protection of the Po Valley and for the mechanization of agriculture: In all, 97 workers, 58 projects, 23 scientific papers, and 29 cooperation projects with companies.

The "research citadel" under the aegis of CNR in "Tecnocity" is completed with Ceris (Institute for Research on Enterprise and Development, which studies the financial structure of companies by analyzing their investment models and investigates industrial reconversion, organization and export problems); and by the Center for the Study of Immunogenetics and Tissue Compatability.

A true revolution for the CNR has been the establishment of a data bank with information available either on a video display screen or in print in which data concerning 6,000 research projects are stored. Each of them is fed into the computer on the basis of a card showing the nature of the investigation and of the personnel conducting it, the results obtained and know-how acquired. "There isn't anything similar in the world," Professor Rossi Bernardi says proudly, "and this is a tool bound to become increasingly necessary and not exclusively for specialized users. Here is an example of its usefulness. Ecology Minister Zanone wanted to know the location, size and nature of polluting plants in the Massa Carrara area. By typing on a keyboard for a few seconds, all the needed information was retrieved." This is a service in which 300 billion lire were invested and which "Americans, Germans, French and Spaniards are eager to reproduce in their countries."

The information stored will be put at the disposal of research areas throughout the country by means of the terminals placed at the "automation sections" of each of these areas. By doing so, the CNR will put into operation a real-time system of circular distribution of information, with great advantages for research workers.

What are the lines of activity the Council will follow in 1986? The program (200 billion lire to be invested) is based on twelve finalized research projects in the following fields: pure chemistry, energetics, volcanology, oncology, structure and development of the Italian economy, mechanical and biomedical technologies, transports, increase of agricultural productivity, control of infectious diseases, biotechnology, and preventive medicine.

Within the finalized project for transports, the construction of a working prototype of the "research car" is of paramount importance. This was the result of the joint effort with the Fiat Research Center and was shown on the occasion of the meeting at the Agnelli Foundation. It is a "subcompact" car similar to the Y10 in shape and requires a small quantity of gasoline (40 kilometers per liter), maintaining at the same time the performances of existing cars of the same category (maximum speed 135 km/hour, 21 seconds to cover the first 400 meters, traveling 1 km in 40.5 seconds from a standing start). Improved comfort and compliance with road regulations supposedly in force in the 1990's have also been considered.

The first objective of the research, that is, the reduction of fuel consumption, is achieved by drastically lowering the resistance to motion with a low mass (535 Kg), aerodynamic model (Cx = 0.25) and low "rolling coefficient"; and, secondly, by a highly effective anterior-transversal motor-propulsion group with a two-cylinder diesel engine with super-charged direct injection and a continuously variable transmission. The size of the car is reduced: length 3.45 m, width 1.525 and 1.41 m high. The body is almost entirely made of plastic, while the pick-up shaped structural nucleus is made of sheet iron. The production of the car is being studied in terms of an automated assembly.

The program for this "research car" began at the end of 1982 with the execution of the preliminary project. A year later the project for the first prototype called E 1.1 was ready. The subsequent steps were by mid-1984, construction of E 1.1; end of the year, road tests; end of 1985, construction of the second prototype E 1.2 (which differs from the first one in its reduced total weight and innovations in the gear system and internal fittings); end of 1986, checking the results attained.

Back to CNR, what is the philosophy at the basis of tomorrow's strategies? Professor Rossi Bernardi said: "One of the first tasks will be to work on the concentration of centers, institutes and laboratories in the so-called science parks, of which "Tecnocity" is a glowing starting point. A second point is the need to concentrate our institutions in homogenous geographical areas, trying to overcome complex obstacles represented by the paucity and the peculiar shape of the existing infrastructures. These areas should preferably be created near university centers in order to take advantage of the exchange of young people in both directions."

The brains of the Council put forward suggestions and launch projects at a frantic rate. Are there any obstacles from regulations and bureaucracy? "It would take a long time to talk about the limitations to our operativeness," Professor Rossi Bernardi says, "and let's just mention a few things. Our personnel are underpaid, penalized by regulations which are blind and deaf to the priority posed by scientific research. A paradox is the fact that the law forbids hiring a person over 32 years of age; therefore, should we want to entrust Carlo Rubbia, the Nobel prize winner for physics, with the management of an institute, we could not have him sign a contract. CNR research workers earn less than the half of the salary of university researchers. Some of them, who are international authorities in their fields, are determined to pass on to university as associate professors. I have made these difficulties known before the Education Commission of the Parliament. The government is thinking about it and I am convinced it has the political will to find effective, workable solutions."

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